

REMARKS

Claims 1 and 15 have been amended to correct informalities contained therein. No new matter has been added. Upon entry of this Amendment, claims 1-20 remain pending. Reconsideration and allowance of the pending claims are respectfully requested.

In the Office Action dated February 27, 2007, claim 1 was objected to for containing the phrase "adapted to." Claim 1, as well as claim 15 have been amended to remove the objected to phrase. Accordingly, Applicants respectfully request that the objection to claim 1 be withdrawn.

In the Office Action, claims 1-6, 8-16, and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Somekh (U.S. Patent No. 6,427,703) in view of Tanaka et al. (U.S. Patent Application Publication No. 2001/0036741). Applicants respectfully traverse this rejection.

Independent claim 1 recites a lithographic projection apparatus that includes, *inter alia*, "a downstream radical source having a tube connected to a gas supply and configured to provide a beam of radicals directed onto a surface of a component to be cleaned, wherein the radicals are generated within a flow of gas from the gas supply in the tube, and wherein the tube of the radical source is constructed and arranged to be moved relative to the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the beam of radicals is incident on the surface to be cleaned." A *prima facie* case of obviousness has not been made by the Examiner.

Somekh discloses a lithography system (200) that includes an oxidizer source (216) that introduces an oxidizer into an illumination chamber (204) and a process chamber (220). *See* Somekh at col. 6, lns. 19-22. Somekh discloses that the oxidizer is provided by the oxidizer source (216) in an activated state. *See* Somekh at col. 6, lns. 37-38. The oxidizer is introduced to the illumination chamber (204) through a nozzle (224) that is inserted through a wall of the illumination chamber (204), and the oxidizer is also introduced to the process chamber (220) through a nozzle (215) that is inserted through a wall of the process chamber (220). *See* Somekh at col. 7, lns. 11-16; FIG. 2A. The nozzles (215, 224) may be aimed or configured to direct oxidizer over surfaces in the process and illumination chambers (220, 204), respectively. *See* Somekh at col. 7, lns. 19-23. After such configuration, there is no relative movement of the beam of radicals or the surface to be cleaned, as there is no teaching by Somekh that the piping between the oxidizer source (216) and the nozzles (215, 224) is configured to be moved relative to the surface to be cleaned, or that the surface to be cleaned

is configured to be moved relative to the piping so that a beam of radicals is incident on the surface to be cleaned.

Tanaka et al. teaches a local etching apparatus that is configured to produce radicals for locally etching a relatively thick portion present on the surface of the object to be etched, such as a silicon wafer. *See* Tanaka et al. at [0015] and [0047]. The etching apparatus of Tanaka et al. does not clean the wafer, but instead etches the wafer, which would actually generate contaminants rather than clean them away. *See* Tanaka et al. at [0066] (“the relatively thick portion is shaved flat”). As such, Tanaka et al. is directed to a completely different field of endeavor, is non-analogous art, and actually teaches away from the teachings of Somekh.

Applicants respectfully submit that one of ordinary skill in the art would not combine the etching apparatus of Tanaka et al. with the electron beam lithography apparatus of Somekh. As an initial matter, Somekh does not disclose that its arrangement of nozzles is in any way inadequate to clean carbon contamination from the surfaces of targeted portions of the electron beam lithography apparatus. Moreover, replacing the nozzles of Somekh with the etching apparatus of Tanaka et al. would generate contaminants within the electron beam lithography apparatus of Somekh, which would be opposite the teachings of Somekh. The Examiner has not provided the requisite analysis as to why one of ordinary skill in the art would combine the elements of Somekh and Tanaka et al. in the manner that the Examiner has proposed. *See KSR Int’l. Co. v. Teleflex, Inc.*, No. 04-1350, slip opinion at page 14 (U.S. Apr. 30, 2007) (a determination must be made as to “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit”). Instead, the Examiner has only offered a conclusory statement that goes against the teachings of one reference (Tanaka et al.). This is clearly inadequate under the Supreme Court’s *KSR* decision.

Moreover, modifying Somekh in the manner that the Examiner has proposed does not provide each and every feature of claim 1. As discussed above and conceded by the Examiner on page 3 of the Office Action, Somekh does not disclose a downstream radical source having a tube connected to a gas supply wherein radicals are generated within a flow of gas from the gas supply in the tube, as recited by claim 1. Thus, merely connecting a movable tube via piping of nozzles (224) of Somekh, as the Examiner has proposed on page 4 of the Office Action, does not change the fact that the oxidizer source (216) of Somekh provides the nozzles (224) with the oxidizer in the activated state. The Examiner has

provided no reasoning as to why one of ordinary skill in the art would modify Somekh to eliminate the oxidizer source (216) and significantly change where the oxidizer is generated. There simply is none.

In view of the foregoing, Applicants respectfully submit that claim 1 and the claims that depend from claim 1 are patentable over Somekh in view of Tanaka et al., and respectfully request that the rejection to claims 1-6, and 8-13 be withdrawn.

Independent claim 14 recites a device manufacturing method that includes, *inter alia*, “generating a beam of radicals in the flow of gas from the gas supply in a tube of a downstream radical source; moving the tube of the radical source relative to a component comprising a surface to be cleaned and/or moving the component relative to the tube of the radical source; and directing said beam of radicals onto the surface to be cleaned so that the beam of radicals is incident on the surface to be cleaned.” A *prima facie* case of obviousness has not been made by the Examiner.

Applicants respectfully submit that one of ordinary skill in the art would not combine the etching apparatus of Tanaka et al. with the electron beam lithography apparatus of Somekh to arrive at the device manufacturing method recited by claim 14. Moreover, the combination proposed by the Examiner does not provide each and every feature of claim 14. Specifically, as discussed above, the oxidizer of Somekh is provided by the oxidizer source (216) in the activated state. The Examiner has provided no reasoning as to why one of ordinary skill in the art would modify Somekh to eliminate the oxidizer source (216) and significantly change where the oxidizer is generated.

In view of the foregoing, Applicants respectfully submit that claim 14 is patentable over Somekh in view of Tanaka et al. and respectfully request that the rejection to claim 14 be withdrawn.

Independent claim 15 recites a lithographic projection apparatus that includes, *inter alia*, “a radical source connected to a gas supply and configured to generate a localized beam of radicals in a flow of gas from the gas supply in a tube of the radical source; and a structure to direct said beam of radicals onto a surface to be cleaned, wherein said radical source is disposed away from said radiation source such that operating conditions of said radical source do not adversely affect said beam of radiation, and wherein the tube of the radical source is constructed and arranged to be moved relative to a component comprising the surface to be cleaned and/or the component is constructed and arranged to be moved relative to the tube of the radical source so that the localized beam of radicals is incident on the

surface to be cleaned.” A *prima facie* case of obviousness has not been made by the Examiner.

Applicants respectfully submit that one of ordinary skill in the art would not combine the etching apparatus of Tanaka et al. with the electron beam lithography apparatus of Somekh to arrive at the lithographic projection apparatus recited by claim 15. Moreover, the combination proposed by the Examiner does not provide each and every feature of claim 15. As discussed above, the Examiner has provided no reasoning as to why one of ordinary skill in the art would modify Somekh to eliminate the oxidizer source (216) and significantly change where the oxidizer is generated.

Accordingly, Applicants respectfully submit that claim 15 and the claims that depend from claim 15 are patentable over Somekh in view of Tanaka et al., and respectfully request that the rejection to claims 15, 16, and 20 be withdrawn.

In the Office Action, claim 7 was rejected as being unpatentable over Somekh in view of Tanaka et al., and further in view of Horiike et al. (U.S. Patent No. 5,308,791). Applicants respectfully traverse this rejection.

Claim 7 depends from claim 6, which depends from claim 1. As discussed above, claim 1 is patentable over Somekh in view of Tanaka et al.

Horiike et al. discloses an apparatus for processing the surface of an Si wafer. *See* Horiike et al. at Abstract. The apparatus includes a cleaning chamber (3) for cleaning the wafer (1). *See* Horiike et al. at col. 4, lns. 15-28. The wafer (1) is cleaned in the cleaning chamber (3) prior to being moved into the process chamber (8) for processing. *See* Horiike et al. at col. 5, lns. 27-48. A plasma generating section (4) has a plasma generating area (12) that is communicated to an inlet (11) of the cleaning chamber (3). *See* Horiike et al. at col. 4, lns. 51-54. Horiike et al. does not teach that the plasma generating section is configured to be moved relative to the wafer or that the wafer may be moved relative to the plasma generating section so that a beam of radicals are incident on the surface of the wafer. The wafer is merely moved into and out of the cleaning chamber (3), and the inlet (11) generally provides the plasma to the chamber, and does not provide a beam of radical that are incident on the surface of the wafer.

In view of the foregoing, Applicants respectfully submit that claim 7 is patentable over Somekh in view of Tanaka et al. in view of Horiike et al., and respectfully request that the rejection to claim 7 be withdrawn.

In the Office Action, claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Somekh in view of Tanaka et al. and further in view of Sakai et al. (U.S. Patent No. 5,312,519). Applicants respectfully traverse this rejection.

Claim 17 depends from claim 16, which depends from claim 15. As discussed above, claim 15 is patentable over Somekh in view of Tanaka et al.

Sakai et al. discloses a discharge tube (18) that selectively supplies active species of F*(radical) and O*(radical) to a chamber (3) through an active species introduction port (19). *See* Sakai et al. at col. 3, lns. 49-58. The active species are generally supplied to the chamber (3) and are not formed into a localized beam. *See* Sakai et al. at col. 3, ln. 62 – col. 4, ln. 39. Sakai et al. discloses that the introduction port (19) should be positioned near the portion of the apparatus that has the most serious problem of contamination, *see* Sakai et al. at col. 7, lns. 61-65, but does not disclose that the discharge tube may be moved relative to a component having a surface to be cleaned or that a component having a surface to be cleaned may be moved relative to the discharge tube so that a beam of radicals is incident on the surface to be cleaned.

Accordingly, Applicants respectfully submit that claim 17 is patentable over Somekh in view of Tanaka et al. in view of Sakai et al. and respectfully request that the rejection be withdrawn.

In the Office Action, claims 18 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Somekh in view of Tanaka et al., and further in view of Vane (U.S. Patent No. 6,105,589). Applicants respectfully traverse this rejection.

Claim 18 depends from claim 16, which depends from independent claim 15. Claim 19 depends from claim 18. As discussed above, claim 15 is patentable over Somekh in view of Tanaka et al.

Vane discloses a method and apparatus for cleaning electron microscopes. *See* Vane at Abstract. Vane discloses that a plasma chamber (50) is provided to project a plasma into the full specimen chamber (4). *See* Vane at col. 7, ln. 54 – col. 8, ln. 3; FIG. 1. The plasma chamber (50) is separate from the gas supply (42) and gas from the gas supply (42) is fed into the chamber (4) and into the plasma. *See* Vane at col. 8, lns. 17-26; FIG. 1. Oxygen radicals from the plasma are carried into the chamber by convection. *See* Vane at col. 8, lns. 24-25. Vane does not disclose or suggest that the plasma generates a localized beam of radicals or that the plasma chamber may be moved relative to a component having a surface to be

cleaned or that a component having a surface to be cleaned may be moved relative to the plasma chamber so that a beam of radicals is incident on the surface to be cleaned.

Moreover, Vane specifically states that the conductive screen (53) described at col. 7, lns. 62-66 is not a trap for the charged species of the plasma, but instead confines the electric fields and defines and fixes the impedance between the glow electrode (51) and the plasma chamber (50) walls. *See* Vane at col. 7, lns. 62-66. Vane simply does not disclose or suggest that a Faraday grid neutralizes the ionized particles, as recited by claim 18.

Accordingly, Applicants respectfully submit that claims 18 and 19 are patentable over Somekh in view of Tanaka et al. in view of Vane and respectfully request that the rejection to claims 18 and 19 be withdrawn.

All rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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